

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Facilitating Opportunities for Flexible,	)	ET Docket 03-108
Efficient and Reliable Spectrum Use	)	
Employing Cognitive Radio Technologies	)	

**EX PARTE COMMENTS  
ST. CLAIR COUNTY, ILLINOIS**

St. Clair County, Illinois (“County”) hereby supplements in this related proceeding the Reply Comments it filed in the secondary markets rulemaking, WT Docket No. 00-230, last January. At the time, we said that the County “supports the proposals in the Further Notice to permit the commercial lease of public safety frequencies, assuming adequate means for the spectrum to be reclaimed immediately when required for its primary licensed purpose.”<sup>1</sup>

Recently, the Commission took the intermediate step of permitting public safety licensees to lease to other public safety or critical infrastructure users of the spectrum.<sup>2</sup> The County encourages the FCC to extend the privilege to commercial lessees, given that:

- The activity would be entirely voluntary;
- Meaning that those prospective lessors who mistrusted the technical mechanisms for immediate spectrum reversion upon demand could simply decline to lease;

---

<sup>1</sup> Reply Comments, January 5, 2004, 3.

<sup>2</sup> News Release, July 8, 2004 (“In the case of land mobile public safety services, the Commission allowed leasing arrangements with other public safety entities or entities that provide communications in support of public safety operations, but declined at this time to permit public safety licensees to lease to commercial or other non-public safety operations.”) The text of the order had not been issued at this writing.

- And with the further recognition that not all lease arrangements involving public safety would have to be instantaneously and ruthlessly preemptive.

With regard to the third point, the County noted in earlier comments that its 800 MHz public safety radio system would be built out over a period of five years, and that other entities might conveniently use the spectrum during relatively extended periods when there would be no competing public safety occupancy. (Reply Comments, 2)

One of the County's technical advisors, Paul D. Linnee, co-owner and Communications Development Director of GeoComm Corporation,<sup>3</sup> has written the attached summary of the potential benefits of cognitive radio in making possible the efficient, reliable and interruptible sharing of public safety spectrum with commercial users. The County is pleased to forward Mr. Linnee's analysis in response to Section III.C. of the Notice on application of the technology to secondary market development.

Respectfully submitted,

ST. CLAIR COUNTY, ILLINOIS

By \_\_\_\_\_

James R. Hobson (202) 785-0600

Miller & Van Eaton, P.L.L.C.

1155 Connecticut Avenue, N.W., #1000

Washington, D.C. 20036-4320

July 23, 2004

ITS ATTORNEY

---

<sup>3</sup> Based in St. Cloud, Minnesota, GeoComm ([www.geo-comm.com](http://www.geo-comm.com)) is a full service communications and GIS mapping and radio/911 engineering consulting firm specializing in wired and wireless E9-1-1 implementation management and major public safety/local government radio system projects, especially those of a regional or combined scope.

## Leasing Public Safety Spectrum

Assuming that the technology can be perfected, St. Clair County, IL would be in support of the concepts of leasing out radio spectrum for which it is currently the exclusive licensee.

Simply put, radio spectrum is a commodity that is currently rigidly assigned to only one user in any given geographic service area (with such service area being up to 150 miles in diameter). The reason for this is that when a licensed user has need for spectrum over which to transmit something (voice, data or signaling), and assuming they are the sole licensee on that spectrum in that area, they need access to it right now, and technology has not (historically) been such that said spectrum could be “loaned” out to another user for use while our primary user was not using it.

However, with the advent of new software defined radios and corollary systems, it is conceivable that the spectrum (X radio channels or X KHz or MHz of spectrum) licensed to any one entity could be made available for occasional and secondary use by other users.

Specifically, public safety agencies use radio spectrum in a very “bursty” way. This means that they use it only in short bursts of activity. Those bursts may be very intensive, but they are of a defined duration, which is usually relatively short (less than hours in most cases). If there is a high speed pursuit, involving lots of squad cars, lots of spectrum is used in lots of short messages, but when the pursuit is over, most of that spectrum lies fallow until the next similar need. This is the opposite of, for example, commercial radio stations, where they turn their transmitter on and leave it on for decades, and for every minute of that transmitter’s existence, it is transmitting a continuous signal on that part of the spectrum for which they are licensed.

Consequently, if technology were perfected whereby that spectrum not in use by a given licensed public safety user could practically be re-allocated to other users (even those outside public safety) -- with the built-in understanding that the licensed public safety user has absolute priority access to that spectrum segment -- this would be acceptable, and could provide a needed source of revenue for the licensed public safety user to build and maintain systems capable of this sort of sharing.

A specific example: If a County (such as St. Clair County, IL) is licensed on 16 channels of spectrum at 821/866 MHz, they have exclusive use (in the St. Louis metro area) of 200 KHz of radio spectrum. Conceivably, there could be a dedicated communications pathway between the controller of the trunking system used by St. Clair County to manage access and use of these 200 KHz of spectrum, and some “broker system” that would be kept up to date as to the relative availability or non-availability of St. Clair’s specific spectrum. This being the case, every few seconds the “donor system” (St. Clair) could report out to the “broker system” that it has availability of X KHz of spectrum or X channels to offer for use by other systems in that area. The “broker system” would then poll its connected “recipient systems” to see if anybody needs spectrum at that instant. If, for example, Joe’s Taxi Service needed lots of spectrum due to a crush of taxi activity on a rainy day, and Joe was served by a 800 MHz trunked radio system, connected to the “broker system”, then Joe’s Taxi could rent some spectrum from the “broker”, which would come from the “donor” (St. Clair County) at whatever price was previously agreed.

Of course, should the “donor” have an instant need for spectrum, and Joe’s Taxi is using that spectrum, then the donor asserts its inherent priority and takes over usage of the spectrum from the taxi cabs. If the donor taking this spectrum back means the taxi cabs have no spectrum from that donor any more, then it is between the broker and the Taxi cab company to find other spectrum. If the broker has other connected donor clients who don’t need their spectrum at that instant, they could switch from one donor to the other to meet the needs of the taxi company.

On the other hand, if there were no donors with any spectrum available to the broker, then the broker would not be able to provide needed spectrum to the taxi company and the taxi company would have to wait for spectrum to become available. How long they would have to wait would be a function of the number of connected donors capable of providing spectrum to the broker, and the diversity of their usage. For example, if all the potential donors were Departments of Transportation in a snowy area, and there is a large blizzard, then it could be quite a time that the broker would be getting no donations of spectrum from their donors. On the other hand, if the broker had a diverse group of donors such as highway departments, tree trimmer services, street sweepers, etc. then the chances that all of these services would all need all their spectrum all at one time becomes more remote.

Perhaps the ideal (albeit theoretical) example of how spectrum sharing could be most efficient would be if the donor agency were to be one which had a 100% seasonal, but heavy need, and the recipient agencies were also entities with a 100% seasonal need, at opposite seasons. Perhaps something like a beach life guard service and a furnace repair service. One only works in the summer, and the other only in the winter.

On a less technically intensive level, it would also be possible for the operator of a public safety trunked radio system (such as St. Clair County) to permit secondary usage of its trunked system by commercial lessees, not unlike an SMR operator. In other words, if St. Clair County has a 16 channel trunked system, sized to support a maximum of 2,000 public safety subscriber units during peak activity, and if said peak activity occurs very rarely, then it is reasonable to assume that 90% of the time, the St. Clair trunked system will be operating at something like 35% of capacity. This would mean that at any one split second in time, only 35% of the voice channels in the system ( $15 \text{ voice channels} \times .35 = 5.25$ , rounded up to 6) would be in use. This would mean that there would be 9 voice channels ( $15 - 6 = 9$ ) unused much of the time.

If the County were to permit secondary users either from outside traditional public safety, or from quasi public safety users such as scheduled medical transport providers, these users could operate subscriber equipment which was functioning under a lower system priority than the County-owned public safety radios, and, if the lessee users needed system access during one of the periods when the County users were using all the system resources, the lessee user would not be given a “channel grant”, and would have to await notification from the system (usually only a few seconds, at most) that there was now resource to support them.

Generally, the above description is less of a “spectrum leasing” model than an example of leasing access to a trunked system which is served by X KHz of spectrum, but the end result would be the same: Spectrum (and the infrastructure that supports it) that is unused at a specific

instant could be made usable on a secondary basis to others who have no spectrum of their own, in return for either a per subscriber flat charge, or a per-second of usage charge.

**Important caveats:**

- It is critical that the re-acquisition of “leased out spectrum” be virtually instantaneous if the agency making the donation is a real-time crisis response agency in the public safety services.
- It is critical that the donor agencies have an incentive to participate (providing that the technology proves viable) via the potential of cash generation via participation. Such a potential for cash generation could be widely viewed by potential public safety spectrum donors as a viable rationale for making the multi-million dollar investments in the types of radio systems that would permit such activities.
  - o *Simply put, too many public safety agencies will not spend for, or cannot afford, the migration to the new type of high-tech, computer managed radio systems that would be a prerequisite to such spectrum sharing, yet such systems are a critical link in creating functional interoperability between public safety radio systems as well as implementing of desirable spectrum management technologies such as narrow banding and trunking. However, if by paying for such a new system, the public safety agency could open up an avenue for revenue to defray the cost of the new system, they might be more inclined to do so.*

Paul D. Linnee  
July, 2004